GLOSSARY OF TERMS

FOR CONTAMINANT FACT SHEETS

Advanced Water Treatment Research Program - A Reclamation research program which specifically supports engineering and research that has a direct impact on Reclamation's mission. The primary goal of the program is to provide engineering assistance and research support for Reclamation's Regional and Area Offices.

Agglomeration - The coming together or clumping of small scattered particles into larger particles which settle.

Alkalinity - The capacity of water to neutralize acids. A measure of how much acid can be added to a liquid without causing a great change in pH.

Anion - A negatively charged ion resulting from the dissociation of salts, minerals, or acids in water.

Antiscalant - A chemical agent added to water that raises the solubility limit and inhibits chemical precipitation.

Bacteria - Microscopic living organisms usually consisting of a single cell which live either by absorbing food from the environment (photosynthesizing) or by using some chemical reactions to provide energy and multiply by simple division.

Best Available Technology - A USEPA term for the water treatment process(es) that provide optimum treatment for a specified contaminant.

Biofouling - Blockage or obstruction on a membrane surface due to living or dead animal or plant matter.

Blending - Mixing desalted water with undesalted water to obtain the following advantages: the addition of hardness and alkalinity from undesalted water reduces the corrosivity of the product water; and the amount of posttreatment chemical and the water treatment plant size are reduced, thereby lowering capital and operating costs.

Cation - A positively charged ion resulting from the dissociation of salts, minerals, or acids in water.

Cellulose Acetate - A acetic acid ester of cellulose which when compounded with suitable plasticizer forms a tough thermoplastic material which may be manufactured as semipermeable membrane.

Coagulation - The clumping together of very small particles into larger particles caused by the use of chemicals (coagulants).

Concentrate - The waste stream (concentrated ions) produced as a byproduct of membrane treatment. Also called brine or reject.

Contaminant - Any undesirable physical, chemical, or microbiological substance or matter in a given water source or supply. Anything in water which is not chemically water may be considered a contaminant.

Demineralization - Any process that removes mineral substances from water. Usually synonymous with deionization.

Desalination and Water Purification Research and Development Program - A Reclamation research program funded from October 1997 to September 2002, with the primary goal of developing more cost-effective, technologically efficient, and implementable means to desalinate water.

Direct Filtration - A method of filtration where the feed stream is fed directly to the filtration media. In conventional terms, the conventional treatment train less sedimentation or clarification.

Distillation - The process of heating water to evaporation and its subsequent condensation to purify the water.

Electrodialysis - A process in which ions are transferred through membranes from a less concentrated to a more concentrated solution as a result of the passage of direct current electrical potential.

Electrodialysis Reversal - An automatic operating feature of some ED units that reverses the electrical potential applied to the two electrodes about every 15 minutes to promote cleaning of the unit.

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Feed Water - The input solution to any water treatment process.

Flocculation -The gathering together of small particles in water by gentle mixing after the addition of coagulant chemicals to form larger particles.

Fouling - The act of depositing suspended solids on a membrane surface or in the feed channel which impedes the proper operation of the membrane unit.

Greensand - A naturally occurring mineral that consists largely of dark greenish grains of glauconite, and is a natural ion exchange mineral capable of softening water and removing iron and manganese.

Inorganic - Substances which are of mineral origin, such as sand, salt, iron, and calcium salts.

Ion - An electrically charged atom, radical, or molecule formed by the loss or gain of one or more electrons.

Ion Exchange - A chemical process where certain unwanted ions of a given electrical charge are absorbed on to resin, removed from solution, and replaced by wanted ions of a like charge.

Maximum Contaminant Level - The maximum concentration of a contaminant allowed under the USEPA National Primary Drinking Water Standards. Primary contaminants threaten human health.

Maximum Contaminant Level Goal - The recommended maximum concentration of a contaminant allowed under the USEPA National Primary Drinking Water Standards. MCLGs are not enforceable, and are health goals based entirely on health effects.

Membrane - A thin sheet of natural or synthetic material that is permeable to substances in solution.

Microfiltration - The low pressure membrane filtration through a coherent medium with a nominal pore size range from slightly below 0.1 µm to slightly above 1.5 µm.

Microorganisms - A plant or animal of microscopic size.

Mobile Treatment Plant - Reclamation's MTP was constrcuted to provide technical assistance to small and Native American communities which lack financial resources to remove the health risks from their water supply and meet increasingly stringent water quality regulations. The MTP is used to determine the optimum water treatment process which achieves the desired product water quality. For qualified communities, the MTP and supporting staff of engineers, chemists, scientists, and technicians will address water treatment problems and recommend solutions on a 50-50 cost share basis.

Nanofiltration - A membrane process capable of filtering down to 0.001 micron. NF has a lower rejection rate for monovalent ions than multivalent ions and can operate at significantly lower operating pressures than RO membranes.

Organic - Substances that come from animal or plant sources, and always contain carbon.

Oxidation - The addition of oxygen, removal of hydrogen, or the removal of electrons from an element or compound.

Pathogens - Disease causing organisms.

Permeate - The product water from a desalting process. Also called product.

pH - Measurement of acidity (<7) or alkalinity (>7). The logarithm of the reciprocal of hydrogen ion concentration in an aqueous solution.

Phytoplankton - Small, usually microscopic plants (such as algae) found in lakes, reservoirs, or other bodies of water.

Pretreatment - Treatment units located upstream of the main treatment process which are necessary to remove compounds that are detrimental to the main treatment process.

Product - See permeate.

Protozoa - Single-celled, parasitic animals.

Raw Water - Water in its natural state, prior to any treatment. Usually the water entering the first treatment process of a treatment plant.

Recovery - The amount of permeate water attainable, expressed as a percent of the feed flow.

Rejection - The process where certain ions are not allowed to pass through a semipermeable membrane.

Reject - See concentrate.

Resins - A class of chemicals, many of which have ionic replacing properties to absorb specific ions (and releasing others) such as ammonia, nitrate, metals, etc. An anion resin adsorbs anions in the water while a cation resin removes cations in the water. Both require careful selection of a regenerant type and concentration (i.e. caustic or acid base).

Reverse Osmosis - The reverse of the natural osmosis process. The application of pressure to a concentrated solution which causes the passage of a liquid from the concentrated solution to a weaker solution across a semipermeable membrane.
Secondary Maximum Contaminant Level - The maximum concentration of a contaminant allowed under the USEPA National Secondary Drinking Water Standards. Secondary contaminants do not threaten human health, but cause aesthetic problems.

Sedimentation - A process in which solid particles settle out of the water being treated in a clarifier or sedimentation basin.

Sediments - A general description of any number of materials or large waterborne particles that settle.

Scaling - A process where precipitation or crystallation of salt compounds or solids form a coating on working surfaces of a system.

Semipermeable - The ability to allow some molecules from a mixture to pass through but not all.

Sodium Bisulfite - An acid salt ($NaHSO_3$) usually prepared by passing sulfur dioxide through a solution of sodium carbonate.

Total Dissolved Solids - All of the dissolved solids in the water. The residue after filtering of suspended solids and evaporation.

Total Plant Cost - The cost of treated water expressed in $/1000 gal. TPC includes the annualized capital equipment costs for all the unit processes, annual O&M costs, and various project related special costs.

Total Suspended Solids - The quantity of material removed by filtering, usually with either a Gooch crucible or a 0.45 µm filter

Toxicant - A substance which is poisonous to an organism.

Treatment Technique - A USEPA term for a procedure that a water system must follow, in lieu of meeting an MCL, that assures the water delivered to the system's customers prevents known or anticipated adverse health effects. The procedures include such things as installation of a treatment technology to achieve specified goals, self-certification of adhering to certain standard operating procedures, public education, replacement of pipe, etc.

Turbidity - The cloudy appearance of water caused by the presence of suspended particles and colloidal matter, which interferes with the passage of light through the water.

Viruses - Obligate microorganisms capable of causing disease.

Water Treatment Estimation Routine - WaTER is an Excel spreadsheet application developed for use with Reclamation's MTP. The program is a result of a cooperative effort between Reclamation and the National Institute of Standards and Technology. Unlike other cost estimation programs that require the user to have information about the size of equipment and chemical dosage rates, the only inputs required for the WaTER program are the production capacity and raw water quality composition.

Water Treatment Technology Program - A Reclamation research program that formed partnerships with private industry, universities, and local communities to address a broad range of desalting and water treatment needs. The overall objective of the program was to reduce the cost of desalting and water treatment technologies. Funding for the program concluded in September 1997.